

NOTICE OF  
CHANGE

INCH- POUND

MIL-STD-777E(SH)  
NOTICE 3  
1 June 1995

# MILITARY STANDARD

## SCHEDULE OF PIPING, VALVES, FITTINGS, AND ASSOCIATED PIPING COMPONENTS FOR NAVAL SURFACE SHIPS

TO ALL HOLDERS OF MIL-STD-777E(SH):

1. THE FOLLOWING PAGES OF MIL-STD-777E(SH) HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
7	1 June 1995	7	7 February 1986
8	7 February 1986	8	REPRINTED WITHOUT CHANGE
11	7 February 1986	11	REPRINTED WITHOUT CHANGE
12	1 June 1995	12	7 February 1986
12a	1 June 1995	NEW PAGE	
12b	1 June 1995	NEW PAGE	

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-777E(SH) will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or canceled.

Preparing activity:  
Navy - SH  
(Project 4730-N111)

AMSC N/A

FSC 4730  
4820

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.



MIL-STD-777E(SH)  
NOTICE 3

- (1) For service temperatures to 1000°F coating in accordance with MIL-C-81751, type I, class 4.
- (2) For service temperatures to 650°F and for high humidity areas, coating in accordance with MIL-C-81751, type I, class 4; MIL-C-87115, class 3; or MIL-C-83488, type II, class 3.
- (3) For service temperatures to 300°F coating in accordance with MIL-C-81751, type I, class 4; MIL-C-87115, class 3; MIL-C-83488, type II, class 3; or ASTM B 633, type II, class 13.

4.16 Flange finishes. The machine surface finish of gasket mating surfaces on flanges in piping systems and connected components shall be in accordance with ASME B46.1 and as follows:

(a) Non-ferrous and ferrous flanges for use with sheet gaskets:

- (1) For flanges of nominal size of 12 inches or less, a finish with circular lay (concentric) of 500 to 1000 or (spiral) 125 to 50 roughness average ( $R_a$ ) produced by machining 30 to 80 serrations of uniform depth per inch of flange face width.
- (2) For flanges over a nominal size of 12 inches, the requirements shall be the same except that 21 to 80 serrations per inch of flange face may be used.
- (3) For flanges where the flange face cannot be turned and tool marks run across the flange face, the surface finish shall have a maximum  $R_a$  of 500.

(b) Flanges for O-ring seals:

- (1) A finish of 32  $R_a$  maximum in O-ring grooves for liquid service and 16  $R_a$  for vacuum and gasses.
- (2) A finish of 63 or smoother  $R_a$  on the flange face opposite the groove.

(c) Ferrous flanges for use with spiral wound (metallic) gaskets:

- (1) A finish with a circular lay (concentric or spiral) of 125 to 250  $R_a$  produced by machining not less than 40 serrations of uniform depth per inch of flange face width.
- (2) For flanges where the flange face cannot be turned and tool marks run across the flange face, the surface finish shall be 63 to 125  $R_a$ .

4.17 Weld joint and backing ring design shall comply with MIL-STD-22 and MIL-STD-278 as appropriate.

4.18 Flat face non-ferrous flanges shall not be mated with raised face steel flanges. Steel flanges shall be of the flat face or raised face type.

Supersedes page 7 of 7 February 1986.

MIL-STD-777E(SH)  
7 February 1986

4.19 Welded branch outlets. Welded branch connections can be effected by the following techniques:

- (a) Extruded.
- (b) Saddle.
- (c) Boss.
- (d) Integrally reinforced branch outlet or integrally reinforced insert butt welding pipe fitting.

Extruded and saddle type branch connections shall be designed to meet the requirements of ANSI/ASME B31.1.

4.20 Unreinforced branch connections (a connection where the branch pipe is attached directly to the pipe run by welding and joint fabrication does not include the techniques specified in 4.18 (c) and (d)) shall not be used in any system where the design gauge pressure is over 150 lb/in<sup>2</sup> or the design temperature is over 450°F. The required reinforcement shall not be obtained via weld build-up, and any branch connection fabricated by the use of welding only will be considered as unreinforced.

4.21 Only oil free packing and gaskets shall be used in valves and components on nuclear-powered ships in secondary plant systems. Application shall include, although not necessarily be limited to, the following:

- (a) Condensate.
- (b) Feed.
- (c) Steam drains.
- (d) Main steam.
- (e) Auxiliary steam.
- (f) Air ejector piping.
- (g) Distilling (only steam, condensate and distillate portions).
- (h) Reserve feed.

4.22 Standard bulkhead penetration fittings, are shown on Drawings 803-1385866 and 810-1385899.

4.23 Ground joint union bonnets shall not be used in vacuum service unless the bonnet design utilizes an O-ring or gasket seal which is totally captured. Ground joint unions in accordance with MIL-F-1183, shall not be used for ship-board piping applications unless an O-ring gasket and a retainer ring are used as a secondary seal.

4.24 Gaskets and threaded fasteners noted in this standard are for line joints only.

4.25 Only metallic piping components shall be used in missile blast areas.

4.26 Slip-on flanges shall not be used, except as noted herein.

4.27 The words steam generator, as used in this standard, are applicable to both nuclear and non-nuclear ships installations.

REPRINTED WITHOUT CHANGE.

MIL-STD-777E(SH)

7 February 1986

4.38 Flanges shall not be fabricated from bar stock material. Additionally fittings other than couplings and concentric reducers shall not be fabricated from bar stock material unless a specific document or drawing permits such construction.

4.39 Hydrostatic testing of forged outlets and fittings prior to installation is not required.

4.40 For the radiographic inspection requirements of cast piping system components refer to applicable ships specifications.

4.41 Where an 8 or 10-inch ball valve is required, it shall meet the design, material and test requirements of Drawing 803-5001004, extrapolated for the larger size. The end connections shall be flanged. Modification for power operation shall be made when required.

4.42 Gaskets provided in accordance with MIL-G-21032 shall be class B except that where the gasket is normally exposed to sea water the gasket shall be class C.

4.43 Where sheet gasket material of synthetic rubber in accordance with MIL-G-1149 is specified, cloth insert rubber in accordance with HH-P-151 may be used. However, in using cloth insert rubber gaskets, precautions shall be taken to avoid pickling the joint containing the gasket to remove rust and scale using compounds or solutions containing hydrochloric acid, sulfuric acid or sodium bisulphate.

4.44 The expanding test for piping in accordance with MIL-T-20157 is not required since flaring is not permitted for shipboard applications.

4.45 Use of special or commercial items not covered by this standard and for items where the material or applicable document has not been designated shall be subject to approval by the cognizant Supervisor of Shipbuilding, Naval Shipyard or NAVSEA.

4.46 Valve actuators. Valve electric actuators shall be in accordance with DOD-V-24657.

4.46.1 For non-nuclear ships, remote manual valve actuating systems shall be designed and installed in accordance with the following technical manuals:

- (a) S9505-AG-MMM-010 Design Criteria and Installation Requirements; Rigid Rod Valve Remote Control Systems.
- (b) S6435-QJ-MMC-010 Design Criteria and Installation Requirements; Remote Mechanical Valve Actuator System - RMVA.
- (c) 0948-LP-022-7010 Valve Remote Control Systems. These systems shall be limited to a maximum length of eight (8) feet.

4.47 Specific categories and groups contained in this document allow the use of glass reinforced plastic (GRP) pipe and fittings. However, the use of GRP is limited to the following specific applications:

REPRINTED WITHOUT CHANGE.

MIL-STD-777E(SH)  
NOTICE 3

- (a) Deck drain systems, excluding those used for flight decks, hanger decks, and helicopter platforms, including VERTREP areas.
- (b) Distilled water systems.
- (c) Main and secondary drainage systems.
- (d) Those portions of the chilled water system providing non-vital services, that is, those services not classified "W, or not a machinery space demand, or not an electronic cooling water system".
- (e) Those portions of the low pressure compressed air system providing non-vital services, that is, those services whose continued operation is not essential for maintaining ship control, propulsion, communications, seaworthiness, combat capability or survivability.
- (f) Oily water and waste water drain collecting system.
- (g) Plumbing vents.
- (h) Potable water.
- (i) Seawater flushing systems.
- (j) Those portions of seawater cooling systems providing non-vital services, that is, those services whose continued operation is not essential for maintaining ship control, propulsion, communications, seaworthiness, combat capability or survivability.

4.48 Except for GRP or wood hull ships, the total amount of GRP in a space shall not exceed 25 pounds per 1000 cubic foot of volume for empty pipe situations, and 50 pounds per 1000 cubic foot of volume for flowing or stagnant pipe situations.

4.49 Mechanically attached fittings (MAFs). Fittings utilizing mechanical means of attachment to piping (for example, crimping, ring locking, heat shrinking) are available from commercial suppliers. However, only limited approvals for specific MAF types and compositions have been granted for use in certain ship spaces and piping systems. Approvals are presently limited to fittings 2 1/2 NPS and below in size. MAFs may be substituted for welded or silver-brazed fittings within the MAF application and performance requirements as specified in NSTM 505, unless additional approval/notification of the substitution is required by the appropriate contractual document. Only approved MAFs that have passed the fire test requirements of ASTM F 1387 shall be used in fire hazardous areas or in systems that do not allow silver-brazed fittings. Except for training purposes, there are no joint record requirements for the currently approved MAFs.

## 5. SERVICE CATEGORIES AND GROUPS

5.1 Service categories and groups shall be as specified hereinafter. When any category and group is modified, this record will be corrected and reissued to indicate the latest date of issue of that category and group.

5.2 For each service category and group, the reference to maximum system for pressure and temperature is not meant to infer that only systems with these conditions are applicable to the category and group; only that the components and

MIL-STD-777E(SH)  
NOTICE 3

materials identified are suitable up to these maximum conditions, unless notes within a category and group identify other limitations. The contractor or installing activity shall be responsible for matching system requirements as closely as possible with the applicable category and group.

<u>Category and group</u>	<u>Service</u>	<u>Date</u>
A-1	Steam and steam drains, 1500 lb/in <sup>2</sup> , 1000°F	February 7, 1986
A-2	Steam and steam drains, 1500 lb/in <sup>2</sup> , 775°F	February 7, 1986
A-3	Propulsion plant saturated steam and steam drains, 600 to 1500 lb/in <sup>2</sup> , 775°F	February 7, 1986
A-4	Steam and steam drains, 600 lb/in <sup>2</sup> , 875°F	February 7, 1986
A-5	Steam and steam drains, 600 lb/in <sup>2</sup> , 775°F	February 7, 1986
A-6	Steam and steam drains, 150 lb/in <sup>2</sup> , 775°F	February 7, 1986
A-7	Steam, 100 lb/in <sup>2</sup> , 875°F	February 7, 1986

NEW PAGE.

MIL-STD-777E(SH)  
NOTICE 3

THIS PAGE INTENTIONALLY LEFT BLANK.

NEW PAGE.